Multi-Role Armament & Ammunition System ATD

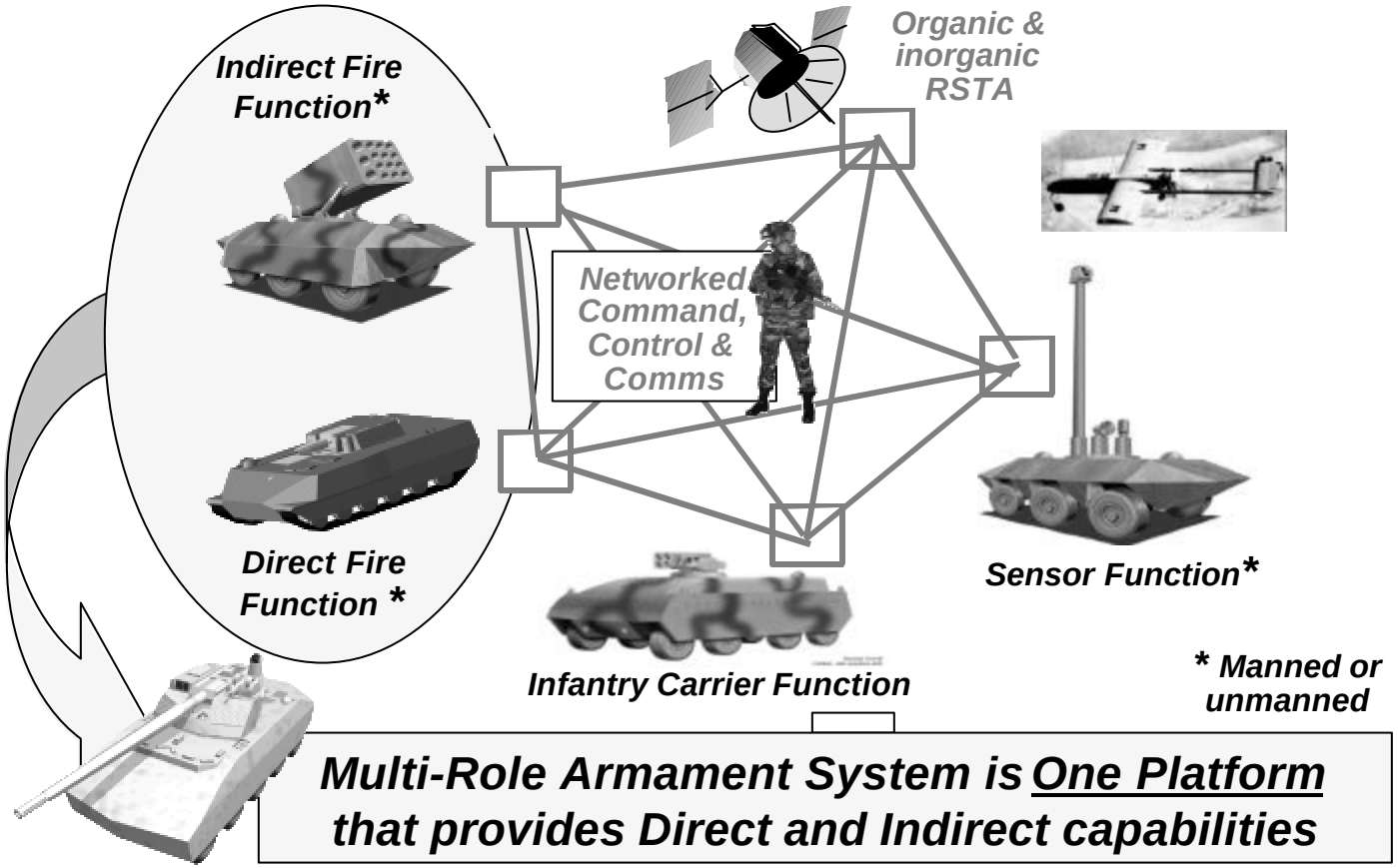
GDAS Program Scope and Approach

NDIA 36th Guns & Ammunition Symposium April 9 - 12, 2001

Dr. Neale Messina
Director-Systems Management
General Dynamics Armament Systems/
Princeton Combustion Research Labs

GENERAL DYNAMICS
Armament Systems

Future Combat Systems
Enabling the Objective Force

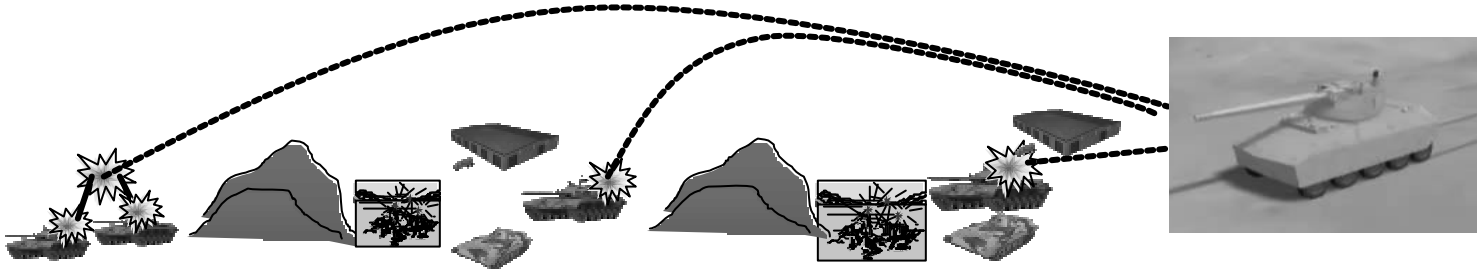


Multi-Role Armament System is <u>One Platform</u> that provides Direct and Indirect capabilities

ARDEC STO - Multi-Role Armament & Ammunition Suite (MRAAS) ATD

ATD Objective:

Demonstrate an integrated multi-role armament system providing lethality overmatch capability in the expanded "Red Zone" Close Fight and Tactical Deep Fight, enabling the Objective Force to dominate maneuver throughout the Full Spectrum of Conflict.



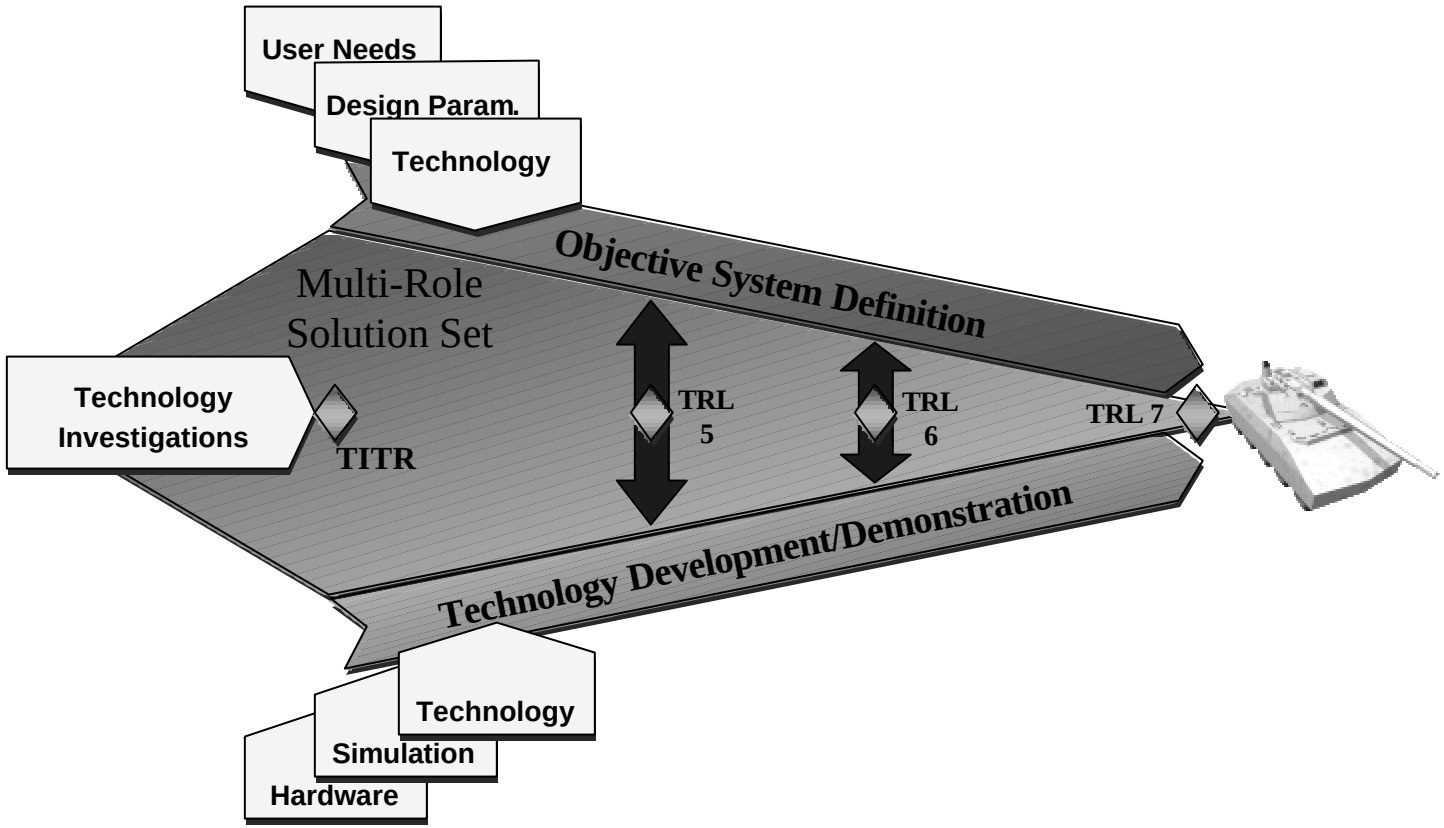
"One Shot.. ....At Least One Kill"

"Multipurpose/Precision Point Target Defeat"

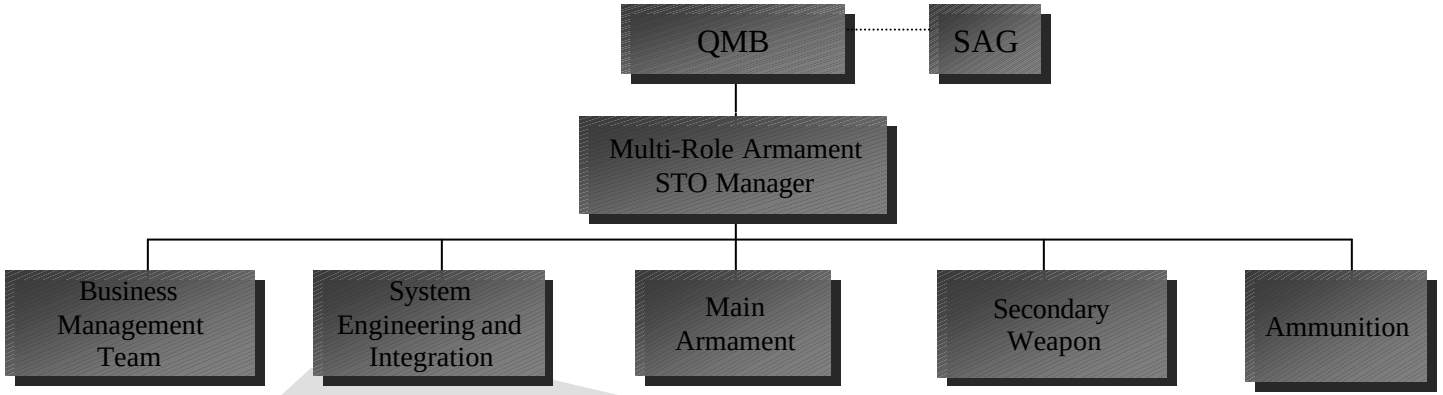
NLOS 4-50KM ***BLOS 2-12km*** ***LOS 0-4Km***

- **Full-Spectrum Lethality with One Arm't Mission Module**
- **Maximizes Maneuver and Fire Support Capabilities**
- **High Stowed Kill Capacity**
- **Simplified Armament System & Munition Logistics**
- **Multi-Role, Multi-Mission Munition Family**
- **Multi-purpose Warhead Development**
- **Advanced Explosives Development**
- **Deliver 3 Cartridges for DARPA Demonstration**

MRAAS Program Approach



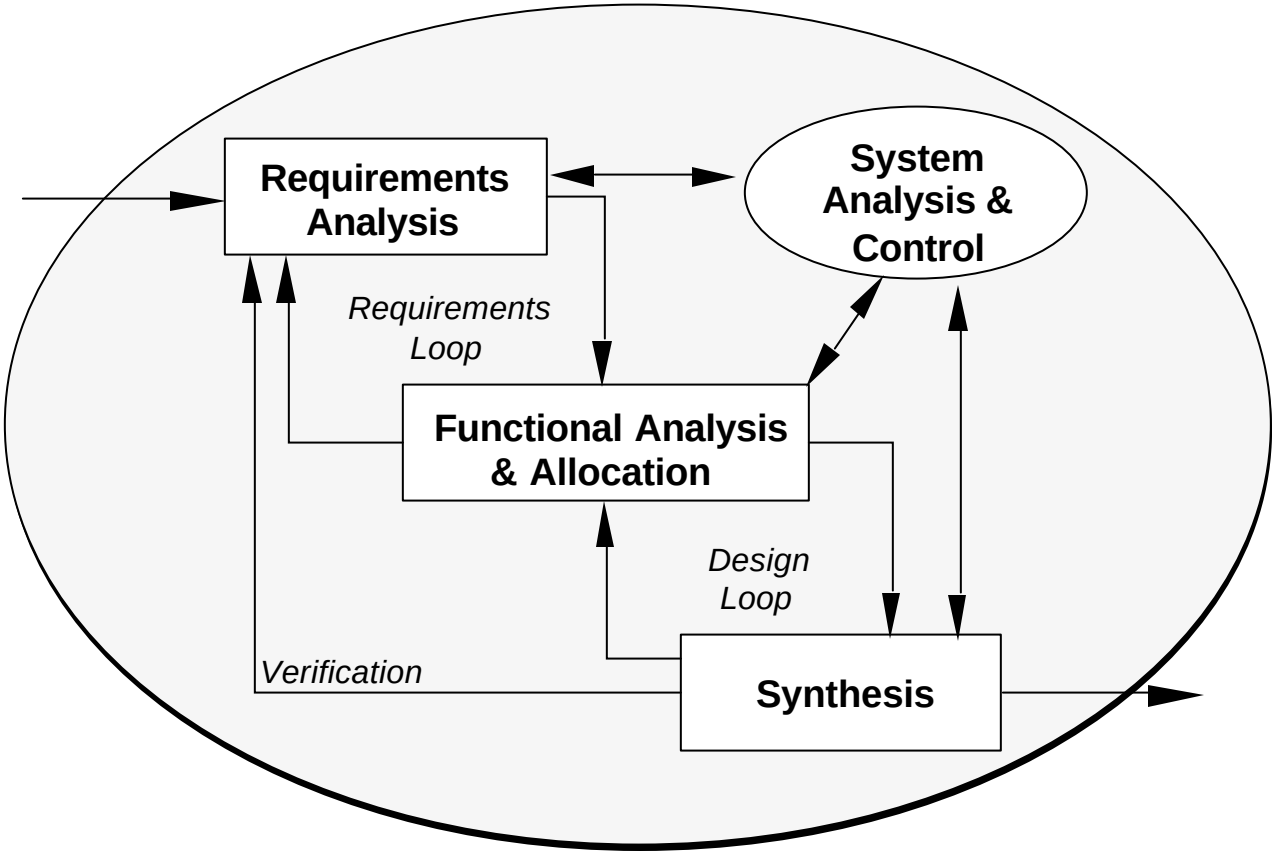
MRAAS ATD Organization



GDAS Scope

- Planning & Process Management
- System Definition
- System Integration
- Modeling & Simulation

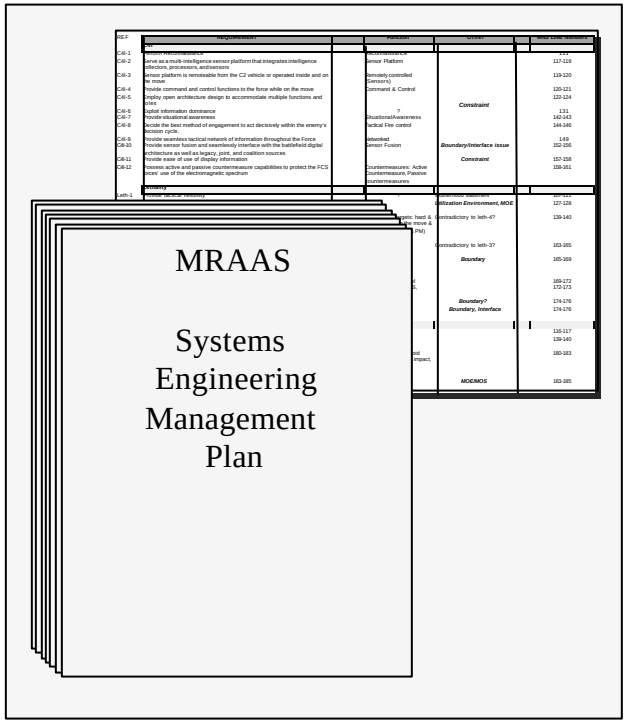
Systems Engineering & Integration Approach



GDAS Program Scope

System Analysis & Control

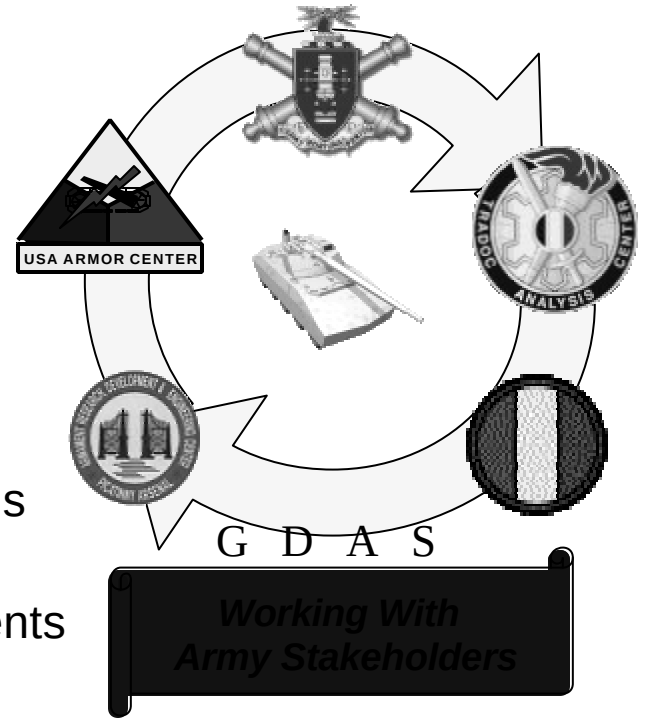
- Systems Engineering Management Plan
- Technology Implementation Plan
- Trade Study Plan
- Test & Evaluation Master Plan
- Data Management Plan
- Configuration Management Plan
- CAIV Management Plan
- Risk Management
- Requirements Management



GDAS Program Scope

Requirements Analysis

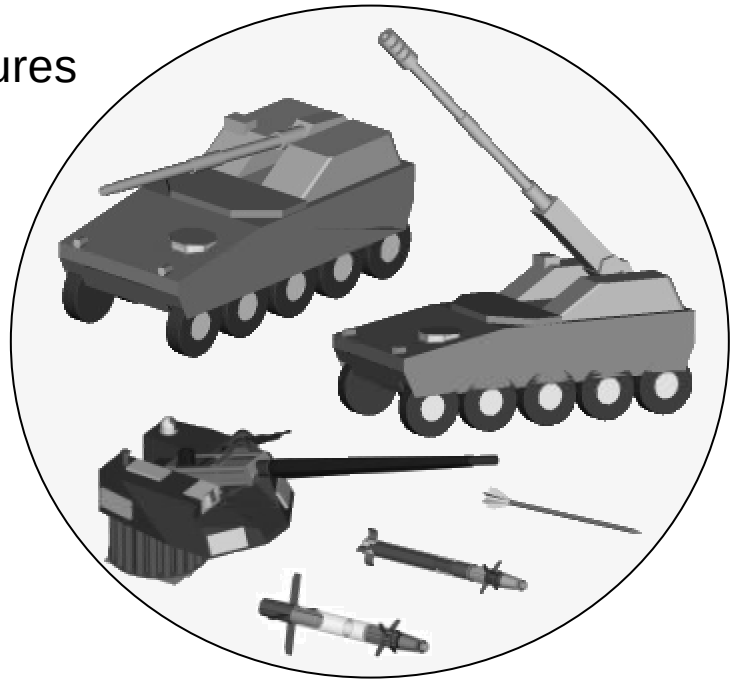
- Elicit and Integrate User Needs
- Develop Operational & Organizational Concept
- Establish analytical basis for requirements (Studies)
- Perform Functional Analysis
- Generate Function Block Diagrams
- Specify Performance, Interface, Design and Constraint Requirements



GDAS Program Scope

Synthesis

- Conceptual “Strawman” Architectures
- Functional Allocation to Elements
- Trade-off Notional Configurations Against Explicit Criteria
- Baseline System Architecture



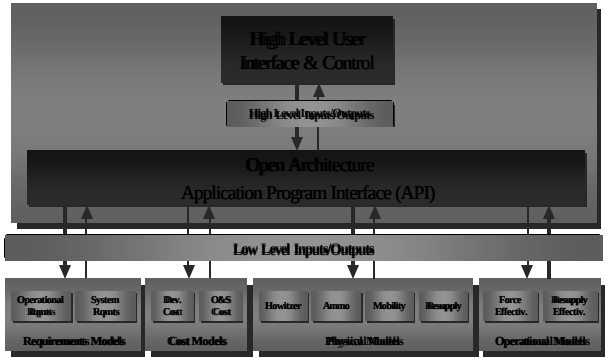
System Integration

- Integrate Technologies
- Identify & Control Interfaces

GDAS Program Scope

Modeling & Simulation

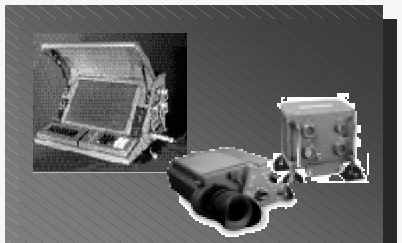
- Overarching Modeling, Simulation & Analysis Study Plan
- Force Effectiveness Study Planning & Support
- Resupply Logistics Effectiveness
- Integrated Virtual Product Modeling & Optimization
- Parametric Cost Analysis



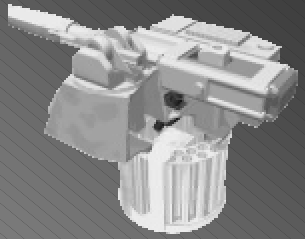
System Level Testing

- Test & Evaluation Planning
- Model Validation Tests

GDAS Capabilities For MRAAS

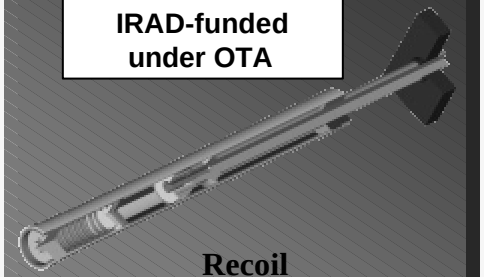


Fire Control



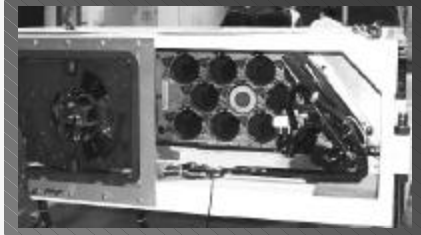
Main Armament Optimization

IRAD-funded under OTA



Recoil

Propulsion



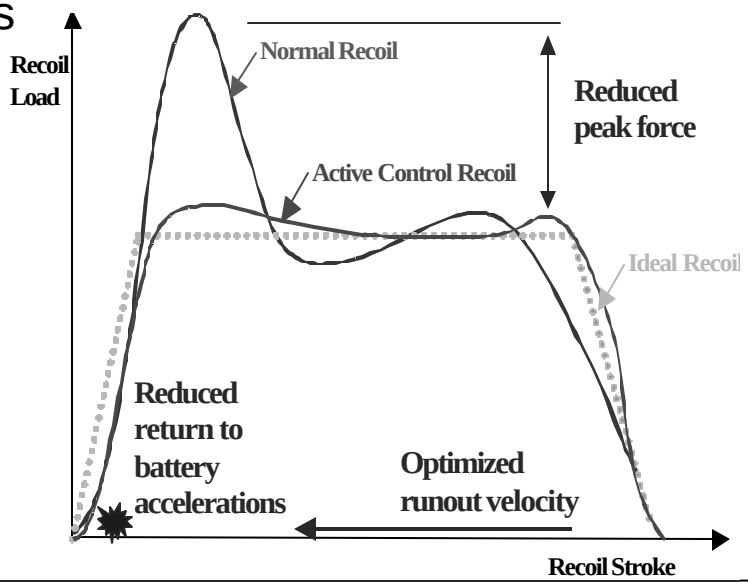
Automated Ammunition Handling

Secondary Armament

GDAS Active Recoil IR&D Project

Benefits of Active Recoil Control

- Minimize peak recoil force
- Reduce weight and size
- Compensate for thermal effects and charge variation
- Enhance accuracy & system stability



GDAS Active Recoil IR&D Project

Magneto-rheological Fluid (MRF) Technology Advantages

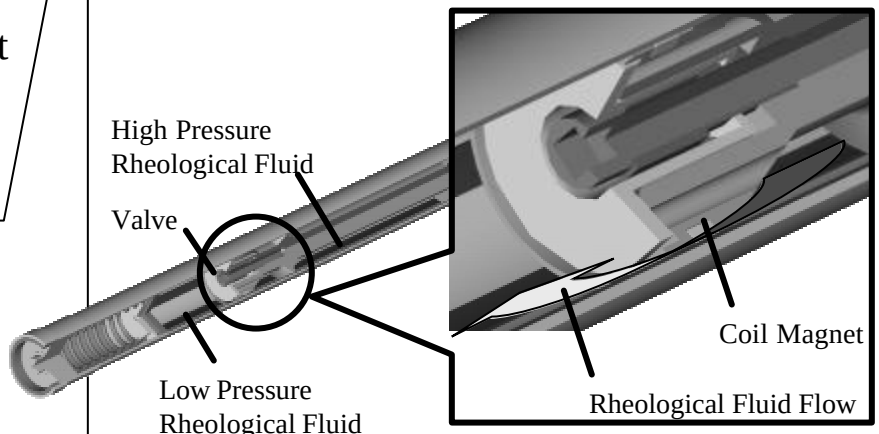
- Recent GDAS studies indicate active recoil control with magneto-rheological fluid most promising.
- GDAS prototype MRF control unit is scalable.

Final Product:

Recoil Simulation Model & Brassboard Demonstrator

Project Activity

- Weaponization Feasibility Study
- Concept Development
- Prototype Design
- Hardware Test and Evaluation
- Demonstrate TRL 5 by April 2003



GDAS Active Recoil IR&D Project

- ☑ Phase 1: Feasibility
  - Assess performance requirements of MRF-controlled gun recoil system
  - Evaluate MRF technology application to gun recoil
- ☐ Phase 2: Technology Development
  - Develop gun recoil concept preliminary design
  - Develop prototype Magnetic Control Unit and Electronic Control Circuit
- ☐ Phase 3: Validation & Demonstration
  - Design, fabricate and test MRF gun recoil system